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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|------------------------|---------------------|------------------|
| 09/590,406 | 06/08/2000 | William James Palmteer | 17541 | 1400 |

7590 10/10/2003

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EXAMINER

NORRIS, JEREMY C

ART UNIT PAPER NUMBER

2827

DATE MAILED: 10/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 09/590,406 | Applicant(s) PALMTEER, WILLIAM JAMES | |
| | Examiner Jeremy C. Norris | Art Unit 2827 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 24-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 24-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 June 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3 April 2003 has been entered.

Drawings

The drawings are objected to because the sectional views are not properly cross-hatched (see MPEP 608.02). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6, 7, 9, 10, 12, 13, 16-18, and 24-29 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,431,328 (hereafter Chang).

Chang discloses, referring to figure 1, a solder-coated article comprising: a substantially non-deformable dielectric core (32) having a largest dimension ranging

from 1 to 1000 microns (see col. 3, lines 20-30), a solderable metal layer (36) completely surrounding said core and, a solder layer (38) completely surrounding said metal layer [claim 1], wherein said solderable metal layer is selected from copper and nickel (see col. 3, lines 25-35) [claim 6], wherein said solder is selected from (a) a solder comprising lead and tin and a (b) solder comprising lead and indium (see col. 3, lines 35-40) [claim 7], wherein said solderable metal layer has a thickness of 0.1 to 1 micron (see col. 3, lines 30-40) [claim 27].

Likewise, Chang discloses, referring to figure 1, a modified substrate comprising: a substrate (30); a metalized pad (26) on said substrate, and a bump feature on said metalized pad, said bump feature comprising a substantially non-deformable dielectric core (32); a solderable metal layer (36) completely surrounding said core; and a solder region (38) completely surrounding said solderable metal layer and contacting at least a portion of said metalized pad [claim 9], wherein said substrate is a semiconductor substrate [claim 10], wherein said solderable metal layer has a thickness of 0.1 to 1 micron (see col. 3, lines 30-40) [claim 28].

Similarly, Chang discloses, referring to figure 3, a modified substrate comprising: a substrate (20); a metalized pad (24) on said substrate, and a bump feature on said metalized pad, said bump feature comprising a substantially non-deformable dielectric core (32); a solderable metal layer (36) completely surrounding said core; and a solder region (38) completely surrounding said solderable metal layer and contacting at least a portion of said metalized pad [claim 9], wherein the substrate is a printed circuit board [claims 12, 13].

Additionally, Chang discloses, referring to figure 4, a solder bonded assembly comprising: a first substrate (30) comprising a first solder pad (26); a second substrate (20) comprising a second solder pad (24); a bump feature comprising a substantially non-deformable dielectric core (32), a solderable metal layer (36) completely surrounding said core and a solder layer (38) completely surrounding said solderable metal layer, said bump feature being disposed between said first and second solder pads; and said solder layer covering at least a portion of each of (a) said first solder pad, (b) and said second solder pad [claim 16], wherein the first and second substrates are selected from the group consisting of a semiconductor substrate, a ceramic substrate, and a printed circuit [claim 17], wherein said first substrate is a semiconductor substrate and said second substrate is a printed circuit [claim 18], wherein said solderable metal layer has a thickness of 0.1 to 1 micron (see col. 3, lines 60-65) [claim 29].

Moreover, Chang discloses, referring to figure 4, a solder-coated article comprising: a dielectric core (32) having a largest dimension ranging from 1 to 1000 microns, a solderable metal layer (36) completely surrounding said core; and a solder layer (38) completely surrounding said metal layer; wherein said dielectric core has a melting temperature higher than said solder layer [claim 24].

Also, Chang discloses, referring to figure 4, a modified substrate comprising: a substrate (20); a metalized pad (24) on said substrate; and a bump feature on said metalized pad, said bump feature comprising a dielectric core (32); a solderable metal layer (36) completely surrounding said core; and a solder region (32) completely

surrounding said solderable metal layer and contacting at least a portion of said metalized pad; wherein said dielectric core has a melting temperature higher than said solderable metal layer [claim 25].

Furthermore, Chang discloses, referring to figure 4, a solder bonded assembly comprising: a first substrate (20) comprising a first solder pad (24); a second substrate (30) comprising a second solder pad (26); a bump feature comprising a dielectric core (32) a solderable metal layer (36) completely surrounding said core and a solder layer (38) completely surrounding said solderable metal layer, said bump feature being disposed between said first and second solder pads; and said solder layer covering at least a portion of each of (a) said first solder pad, (b) and said second solder pad; wherein said dielectric core has a melting temperature higher than said solderable metal layer [claim 26].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-5, 11, 14, 15, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang in view of US 6,337,445 (hereafter Abbott).

Regarding claims 2, 3, 14, 15, 19, and 20, Chang discloses the claimed invention as described above except Chang does not specifically state that the core is ceramic [claims 2, 14, 19] or glass [claims 3, 15, 20]. However, it would have been obvious, to

one having ordinary skill in the art, at the time of invention, to use glass or ceramic as the core since it is well known in the art that these materials are interchangeable to be employed in a composite solder bump as evidenced by Abbott (see col. 8, lines 15-35). The motivation for doing so would have been to better match the CTE of the substrates being joined (see Abbott col. 8, lines 15-35). Moreover, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Additionally, regarding claims 4 & 5, Chang discloses the claimed invention as described above except Chang does not specifically state that the core is spherical [claim 4] having a diameter in the range of 25-200 microns [claim 5]. However, it would have been obvious, to one having ordinary skill in the art, at the time of invention, to form the core of Chang in a spherical shape since it is well known to employ spherical cores in composite solder bumps as evidenced by Abbott (see figure 6a). Such a modification to Chang would be a mere change in form. Furthermore, it has been held that more than a mere change of form is necessary for patentability. *Span-Deck, Inc v. Fab-Con, Inc.* (CA 8, 1982) 215 USPQ 835. Moreover, Abbott additionally teaches that an appropriate range of bump sizes is typically between 50 to 200 microns (see col. 7, lines 55-65). Therefore, it would have been obvious, to one having ordinary skill in the art, at the time of invention, to further modify the invention of Chang such that the now spherical bumps have a size in the range of 25-200 microns. The motivation for doing so would have been to make the device compatible with flip-chip and chip-scale packages, increasing the applications for the device. In addition, a change in size is

generally recognized as being within the level of ordinary skill in the art, *In re Rose*, 105 USPQ 237 (CCPA 1955), and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claim 11, Chang discloses the claimed invention except Chang does not specifically state that the substrate is a ceramic substrate. However, it would have been obvious, to one having ordinary skill in the art, at the time of invention, to form the substrate in the invention of Chang of ceramic since it is notoriously well known in the art to comprise substrates of ceramic, as evidenced by Abbott (see col. 8, lines 30-35). Moreover, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Response to Arguments

Applicant's arguments with respect to claims 1-20 and 24-29 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeremy C. Norris whose telephone number is 703-306-5737. The examiner can normally be reached on Tuesday - Friday, 10am - 7pm.

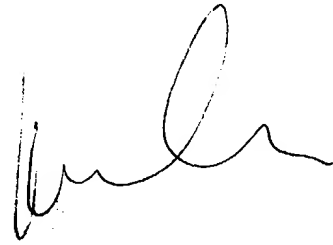
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on 703-308-1233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JCSN

A handwritten signature in black ink, appearing to be 'JCSN', located to the right of the typed name.